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TROPICAL AGRICULTURE is published at the Imperial College of Tropical Agriculture, St. Augustine, Trinidad, West Indies, at the end of the third week of the month preceding the one of issue. Advertisement rates can be obtained at the College from the Editor, or from the Secretary of the College, 14, Trinity Square, London, E.C. 3, England. The Editor will be glad to consider authoritative articles for publication. It is understood that opinions expressed in signed articles are those of the author and do not necessarily represent the policy or opinion of the College Authorities. Increasing numbers of inquiries are being received from various parts of the tropics which can be answered only by persons possessed of an intimate knowledge of local conditions. Enquirers should first satisfy themselves that their local Department of Agriculture is not able to supply them with the desired information before communicating with us. Correspondence which will be replied to is invited on all other matters pertaining to tropical agriculture, science and development.

AGRICULTURAL ORGANISATION.

TROPICAL products have from very early times had a place in the markets of the world, and, within recent years, fostered by the increased demands of the progressive regions within the temperate zone, the trade in tropical products has greatly increased. The majority of these products are agricultural and are of such a nature that they cannot be grown in other regions on account of the climate. Increased trade demand, although undoubtedly providing an incentive, has not been the only factor in the development of the tropics. The delicacies and rarities of these areas encouraged to a great extent early voyages of discovery—more recently the existence of trade requirements led planters to undertake agricultural development, merchants to organise the collection of supplies of wild produce, governments to provide agricultural experiment stations, transport facilities, and to make attempts to supplement inadequate labour supplies. Transport and official help have always been ancillary to agriculture, and it is on the methods of agriculture that the prosperity of the tropics depends. Towards the end of the nineteenth century, an attempt was made by the British Government to encourage agricultural development by the establishment of the Imperial Department of Agriculture for the West Indies, a precursor of many such useful institutions throughout the British Tropics, whilst, quite recently, the Reports on Agricultural Research and Administration and the Proceedings of the Colonial Conference, show that increasing attention is being given to the direction of agricultural work on scientific lines.

Development on the lines laid down in the Report would be of great value to the tropics, whatever the form of agricultural organisation may be. A survey would show two forms, poles apart in outlook and practice. The first is the relatively advanced capitalistic cultivation by the planter or plantation company; the other, the primitive agriculture of the peasant. In the early stages of tropical development administrators had little to go upon in setting out principles of colonisation and colonisation became almost synonymous with "plantation." In the early nineteenth century, probably influenced by the efficiency of the large farm in England and the existing experience of the plantation system, the granting of large areas in freehold to companies was approved, although, later, attempts were made to understand and retain native land systems. From the point of view of efficiency the superiority of the plantation system is patent. Farming is done on more

scientific principles, supplies are more regular and uniform, and the quality of the product is usually better. Furthermore the system has often led to penetration and exploitation of the interior and to the utilisation of waste lands as in Nyasaland, Ceylon, and the Federated Malay States; at the same time it has had a potent influence on necessary transport developments. Plantations, from the point of view of administration—that the ultimate welfare of the colony is the thing to be considered rather than immediate development—have numerous disadvantages which usually boil down to the advantage of native cultivation which is often regarded as less artificial and fundamentally sounder, although less rapid, than development on the plantation system. Informed opinion on the two systems differs. General Smuts, for example, on the good ground of results, favours the plantation system. Sir Hugh Clifford, in his address to the Nigerian Council in 1920, stated that "agricultural interests in tropical countries which are mainly or exclusively in the hands of the native peasantry, have . . . a firmer root than similar enterprises when owned and managed by Europeans, because they are natural growths and not artificial creations, and are self-supporting as regards labour, while European plantations can only be maintained by some form of compulsory labour." All shades of opinion are represented and the matter is still controversial, although, in British West Africa, a unique policy of encouraging economic self-determination under Government supervision has been definitely adopted, while in many other of the Non-Self-Governing Dependencies, effective help is being given to native enterprise by better equipped Agricultural Departments, sound and sympathetic systems of agricultural banks, and, incidentally, by the development of transport systems. The Committee responsible for the Report on Agricultural Organisation do not touch on questions of the relative merits of plantation and native cultivation, but to both, well equipped Agricultural Departments and energetic officers are of inestimable value, the specialist officers more particularly to the first and administrative or district officers to the second.

One difficulty in the past has been to get suitable men for the staffs of the Agricultural Departments and a few years ago, the inadequacy of the supply of trained men, the existence of a large demand, and the establishment of the Imperial College of Tropical Agriculture in Trinidad made it desirable to review, and, if necessary, to revise, the whole system of recruitment of agricultural officers. In 1924, a Committee was appointed to enquire into the whole question of the supply and training of officers, and in March, 1925, an interim report was presented dealing with the scholastic aspect of the problem, this being incorporated in Part I of the Report (Cmd. 2825) on "Agricultural Research and Administration in the Non-Self-Governing Dependencies." Throughout the Report, it is evident that the Committee fully realises the importance of influencing agricultural development by more comprehensive and better equipped Agricultural Departments and at the same time has a sound idea of the type of person required to assist in and direct this development. The difficulties in recruitment encountered since the war led the Colonial Office and the Colonial Governments to take certain steps to render service in the Agricultural Departments more attractive, but these proved inadequate to meet the situation, and the Committee was faced with the task of devising some means of supply. Bearing in mind the type of work to be done and the surroundings of the officers, the objectives sought were discussed and stress was rightly laid on the importance of personality, particularly in the case of general agricultural officers, whose official duties bring them into close personal contact with planters, settlers, and—especially in tropical Africa—with the natives themselves. In addition to a good general education likely to give a breadth of outlook and a sense of proportion, academic qualifications are demanded of the agricultural officer, in accordance with the type of work to be undertaken. In the case of research or specialist officers, an Honours Degree in Pure Science is regarded as the only sure foundation. Candidates for appointment as administrative or district officers, besides possessing an agricultural degree or diploma of one of the Universities or Agricultural Colleges, must acquire a knowledge of economics, administrative procedure, experimental work and plant breeding. Above all, it is recommended that candidates for both classes of appointments must be given the opportunity, before assuming their appointments in the Colonies, of becoming familiar with agricultural work under tropical conditions.

This is provided for in the now well-known policy of granting two-year scholarships by the method of personal selection, the last year to be spent at the Imperial College of Tropical Agriculture in Trinidad where academic knowledge can be applied to practical problems and where instruction can be given in administrative procedure, and the drafting, interpretation and working of ordinances and regulations.

From the point of view of those making use of the services of agricultural officers, the organisation of Agricultural Departments is an important question and this is dealt with in Part IV of the Report. With a proportion of one officer to 6,500 square miles, the Departments are considered understaffed and in many cases there are no assistants to replace officers absent from ordinary duty either through leave, sickness, or special duty.

In all, the Report embodies a wise and far-sighted policy, the benefits of which, though not immediate in their appearance, will be reflected in improved agricultural methods and production throughout the British Tropics when that policy begins to materialise, just as benefits are now accruing from the establishment of agricultural departments throughout the Tropics on the basis of the Imperial Department of Agriculture which had a strong influence on the renaissance of the fortunes of the West Indies.

CELLULOSIC MATERIALS.

Their Biochemical Decomposition.

IN a recent paper entitled "Biochemical decomposition of cellulosic materials, with special reference to the action of fungi" (*Annals of Applied Biology*, xiv, 1, Feb., 1927, pp. 1-44), Dr. R. D. Rege has described the results of his work, carried out at Rothamsted in the laboratory of Mr. E. Hannaford Richards, B.SC., Managing Director of "Adco" Ltd. Dr. Rege came to Rothamsted from India, and commenced work there in November, 1924. He had the great advantage of direct access to the accumulated data obtained by Mr. Richards and his colleague, Mr. R. L. Amoore, many of whose earlier conclusions he was able amply to substantiate.

According to the preliminary work of Hutchinson and Richards, already described in this Journal (*Tropic. Agric.*, Vol. I, Sept., 1924, p. 133, Vol. II, May, 1925, p. 108), the chief requisite for rapid breakdown of straw is a supply of assimilable nitrogen compounds in proper cencentration, under aerobic and slightly alkaline conditions. The soluble nitrogen thus supplied is temporarily immobilized or fixed. The quantity of nitrogen than can be immobilized in this way by 100 parts of dry cellulosic material is termed the "nitrogen factor." Richards and Amoore found, however, that, even in spite of addition of assimilable nitrogen, certain substances, such as sawdust, coconut-shell, rice-husk and bracken, cannot be broken down at all, whilst others, such as banana stem, take a very long time to decompose. Nevertheless, Richards and Hutchinson claim that all materials possessing an adequate content of carbohydrates (30 per cent. and upwards) belonging to the classes starches and pentosans, and not too high a content of ligno-cellulose, are fermentable in the presence of assimilable nitrogen.

Until about thirty years ago, bacteria were considered to be the sole agents causing decomposition of cellulosic matter such as occurs in soil. More recently, however, similar ability has been ascribed to certain fungi. Dr. Rege's work therefore included a special study of the relative importance of bacteria and fungi in their rôles of agents in cellulosic decomposition. The life-histories and physiological behaviour of certain of these fungi (*Aspergillus* sp., *Acremoniella* sp. and *Coprinus* sp.) were examined by him in some detail.

In the chemical part of the investigation, Dr. Rege selected rice-straw and poplar-wood as examples of easily decomposable and of difficulty decomposable cellulosic materials respectively. These materials were allowed to rot, and periodic determinations of their contents of starches, sugars, pentosans, lignins, nitrogen and celluloses were made in order to follow the course of decomposition in each case. Since poplar-wood rots very slowly, the effect of various additions of starches and sugars on its rate of decomposition was measured. Rotting was induced in all cases by adding the requisite quantity of assimilable nitrogen (ammonium carbonate was employed), together with an inoculum of micro-organisms from old decomposed straw. The mixtures were incubated at 35° in bottles. To obtain satisfactory break-down in the case of poplar-wood, addition of mineral salts was found necessary.

Summary of Results and Conclusions.

1. *Pentosans* were proved to be the chief food of micro-organisms that attack mature plant materials.
2. Two factors appear to control the biochemical decomposition of nature plant materials in the presence of assimilable nitrogen. The are (*a*) the *energy supplier* and (*b*) the *inhibitory substance*. The former consists of pentosans, and the latter of lignin.
3. When the ratio of energy supplier (pentosans) to inhibitory substance (lignin) is numerically *greater than* unity, the plant material is easily decomposed (*e.g.* rice straw). When the ratio is less than 0.5, the material is very resistant to microbial attack (*e.g.* poplar-wood). Hence, by means of quantitative chemical analysis, the degree of decomposability of any given material can readily be predicted.
4. Attempts to increase the ratio in resistant materials by the addition of carbohydrates (such as glucose, xylose and starch), however, proved unsuccessful. This failure appears to be due to the inability of the micro-organisms to attack plant-tissues until all the more easily-available foodstuffs are entirely consumed.
5. Fungi appear to play a relatively more prominent part than bacteria during the early stages of decomposition.
6. During later stages of decomposition, fungal remains are decomposed and utilized by other organisms, mainly bacteria.
7. Certain of these fungi seem to be able to live and grow at high temperature. Hence the possibility of their activity in manure heaps is strongly suggested.

Further possible practical developments.

In connection with the fourth conclusion presented above, namely, that the breakdown of resistant materials (such as wood-saw-dust, cane-megass, coconut-shell, coir, and rice-husk) is *not* assisted materially by the simple expedient of adding certain carbohydrate compounds (such as glucose-sugar, or starch), it is important to note that the problem appears not to be altogether insoluble. Experience with hop-bines as raw material for making "Adco" manure (see *The Brewers' Journal*, 15, Feb. 1927), has proved that the coir string with which the bines are bound, suffers quite marked break-down, *provided sufficient hop-leaf material is also present to encourage the development of an abundant cellulose—decomposing micro-organic flora.* In normal waste hop-bines, the proportion of coir-fibre to easily-decomposable leaf-material is relatively very low

but the results certainly indicate that this very tough, highly lignified material can be properly broken down when a suitable excess of unresistant pentosan-containing material, such as dead leaf-tissues, also accompanies it. Along these lines, the "Adco" investigators hope soon to be able to solve the problem of the utilization of even the most highly resistant cellulosic materials for organic manure-making.

F. HARDY.

COLONIAL OFFICE CONFERENCE.

A SUMMARY of the Proceedings of the Colonial Office Conference, which opened on 10th May and concluded on 31st May, was published on 1st June. The Conference will be dealt with in the next issue of *Tropical Agriculture*, but some of the points discussed and recommendations made are outlined below. The Committee set up under Sir Gordon Guggisberg to submit "a scheme for the establishment and financing of a committee to carry further the necessary investigations into, and improvement of, new forms of mechanical transport, with a view to their adoption to the requirements of the undeveloped tropical territories," recommended that a Council for Mechanical Transport in the Colonies be appointed to control investigations, that the actual work should be done by a Committee of experts, and that substantial funds should be provided to carry out investigations on a large scale with a view of obtaining early results.

Special reference was made to medical research and medical education, to the training of natives as dispensers and sanitary officers, and the training of native women as general nurses and workers at child welfare centres.

There was a good deal of discussion on the recruitment and training of colonial civil servants. Development was suggested by means of various training schemes, extended publicity work, and efforts to secure longer notice being given of prospective demand by Colonial Governments. The principle of frequent interchange of officers between the Colonial Office and the various Colonial services was strongly approved, and great importance was attached to the practice of arranging periodical conferences between Heads of Departments.

The scheme for the establishment of a colonial scientific and research service on the lines recommended by the Committee on Agricultural Research and Administration—the report of which was referred to in the editorial of *Tropical Agriculture* for July—was approved and the next practical step will be the establishment of a Committee to put the recommendations into a comprehensive scheme for submission to the Colonial Governments. Attention was also paid to regulations with regard to pensions of colonial officers and teachers, to forestry policy and finance, and to the censorship of films.

COTTON INVESTIGATIONS.

Experiment Stations of the Empire Cotton Growing Corporation.

"REPORTS received from Experiment Stations, 1925-26," recently issued by the Empire Cotton Growing Corporation, contain much that is of interest. Most of the reports are from Africa, and they leave on the mind an impression of a great deal of solid, useful work, accomplished, in many cases, under very trying conditions on new lands and undeveloped stations.

From Barberton, South Africa, there is a detailed account of the selection for Jassid-resistance referred to by Mr. Moerdyk in a recent article in this Journal. Thirty-six lines are being carried on, the best of which are not only resistant to Jassid, but of quality superior to that of the local commercial strains. Cambodia cotton, introduced from Coimbatore, which was disappointing in its first season, showed an all-round improvement in staple during the second year, although the season was drier, and seems to hold some promise for the future.

At Candover, Natal, work was impeded by unfavourable weather and boll-worms, but sufficient results were obtained from spacing experiments to suggest points for further investigation in future years, and valuable observations were made on local pests.

In Swaziland, starting without buildings or prepared land, a headquarters station and a chain of sub-stations in representative tracts of a very diversified country were established, and a commencement made with spacing and time-of-planting experiments, manurial experiments, and selection work, together with observations on possible rotation crops and on insect pests.

The cotton-breeding station at Gatooma, Southern Rhodesia, made an initial trial of a number of varieties to determine the most suitable for local conditions, and in spite of an unfavourable season obtained useful results.

In Nyasaland attention is being paid particularly to the investigation of rotations, and trials with various cereals, legumes, fibres, and oilseeds are reported. From Nigeria there is an interesting account of the establishment of the Corporation's first Seed Farm in the Colony.

Reports by the Plant Breeder in the Sudan, and Cotton Botanist in Uganda, who are Government officers, are included by permission of the Governments concerned. In the Sudan the Plant Breeding section was reorganised, and a survey is given of soils and climate and material available for breeding work, the lines of future work are indicated, and recommendations made *re* Seed Supply.

The breeding of cotton in Uganda is described in some detail, together with certain spacing and other field trials, and laboratory work.

It is worthy of note that three of the reports are by officers who have spent a post-graduate year at the Imperial College of Tropical Agriculture.

CITRUS.

The Cultivation of Citrus Fruits.

Mr. H. Harold Hume has recently issued a new textbook bearing the above title. It is published by Macmillan & Co., and the price is one guinea. The subject is of such importance at the present time that opportunity is being taken to review the book at some length and to offer such comments as may appear necessary in dealing with the subject matter in special reference to tropical conditions.

The volume is intended to take the place of a previous one—Citrus Fruits and their Culture—by the same author. The new work embodies many of the useful features of the old, but covers the ground more thoroughly as a result of the knowledge gained since 1904. The volume may be regarded as an up-to-date treatise covering every phase of citrus activity. Indeed, there is hardly any textbook of tropical import recently issued which will be read with greater interest and appreciation. No pains have been spared to make it both comprehensive and authoritative, and although primarily for Florida conditions, it can be recommended with confidence as a general textbook on the subject of citrus.

Students of the botany of citrus and the variety question generally will find in the treatment of the subject a considerable improvement on the older work, the chapter on limes being perhaps the only one which might have received fuller attention in view of the importance of finding varieties resistant to the Wither-Tip fungus and to which only very scant reference is made.

In respect to commercial citrus varieties, emphasis is laid on the change towards simplification especially in the matter of numbers with a view to greater uniformity of product, while such factors as season of ripening, market quality, resistance to pests and diseases are receiving greater consideration than they have in the past. In Florida the following varieties are now favoured :—

Sweet Oranges : Parson Brown, Hamlin, Pineapple, Valencia, Lue Gim Gong.
Mandarin Oranges : Satsuma, Dancy, Temple and King.
Grapefruit : Triumph, Duncan, Marsh Seedless, and McCarty.

The McCarty grapefruit is highly recommended as being of excellent quality, and it also has the very desirable feature of producing its fruit singly and not in bunches, thus ensuring a good exterior appearance. The presence of seeds in grapefruit, it is pointed out, makes little difference from the consumer's point of view, but may be objectionable if the fruit is to be held very late on the trees as the seeds may germinate and spoil the flavour. Useful information on judging citrus fruits follows the discussion on varieties.

Propagation methods are adequately dealt with in a book of this size, one chapter being devoted to stocks for citrus, mainly sour orange, rough lemon, trifoliate orange, pomelo and sweet orange. In regard to the question of bud variation, reference is made to the work of Shamel and his associates in California, which has served to emphasize the need for care in bud selection. At the same time, some of the conclusions reached have been questioned by a number of leading horticulturists, it being clear that all variations cannot be attributed to bud sports ; variability in size and shape of fruit, thickness of peel, colour, seediness, vigour and yield, noticeable in whole trees, parts of trees or single branches may be brought about by differences in stocks, moisture, soil, food supply, and many other imperfectly understood environmental factors. Many more years of experimentation will be necessary before definite conclusions can be reached on all the points involved ; in other words, we have here the old problem of differentiating between true variations and fluctuations due to environmental factors. In the meantime, however, the grower cannot afford to be lax in his efforts to propagate only from the most carefully selected scions.

The discussion on soils, location, preparation and planting, contain much sound advice and instruction which should be appreciated especially by beginners in the art of citrus culture ; the importance of wind-breaks is stressed and in this connection it may be noted that in Florida the bamboo, camphor tree and Casuarina find a place.

Dealing with the cultivation of citrus groves, we note with pleasure the author's condemnation of clean culture as opposed to such measures that have for their object the maintenance of the soil humus. Under tropical conditions, clean cultivation and no attention to the vegetable matter content of the soil inevitably lead to disastrous results ; the trees become debilitated and prone to numerous pests and diseases. In Florida cultivation along with the free use of cover crops appears to be the safest practice. The plants recommended are beggarweed (*Desmodium tortuosum*), *Crotalaria striata* and *C. retzii* and a non-climbing velvet bean (*Stizolobium* sp.).

There is perhaps no tropical orchard crop that responds so readily to fertilizer treatment as citrus, and the author's recommendations should be carefully studied. In connection with sources of plant food, he rightly points out that stable manure should be used with caution, indeed any organic nitrogenous manures as they are not usually well-balanced and need additions of minerals, notably potash, for best results. Unbalanced manures are apt to produce thick-skinned fruit, full of rag, insipid, and lacking in character. On the other hand, stable manure may be of great assistance in putting new growth into starved and neglected trees. Of commercial fertilisers, nitrate of soda and sulphate of ammonia alternately as sources of nitrogen, ground bone and acid phosphate supplying phosphoric acid and the sulphates of potash have given the most satisfactory results in Florida. For young trees,

a fertilizer containing 6% phosphoric acid, 9% potash and 4% ammonia is necessary and for bearing trees one containing 8, 10 and 3%, respectively. On poor soils, a half pound of fertilizer for each young tree should be incorporated at the time of planting, followed 4 months later by an additional pound; these amounts may be increased in the second year and until bearing stage is reached. When fruiting begins the formula should be changed to the one advised for bearing trees. Thus, trees producing 10 boxes of fruit should receive 30 to 50 lb. of the mixture each.

Under more tropical climatic conditions than Florida, where there are heavy rains and high soil temperatures with attendant leaching of fertilizers and rapid destruction of organic matter, the whole aspect of economic treatment of commercial citrus orchards with special reference to manures and maintenance of fertility will need careful thought and investigation. At any rate, the most successful tropical orchardists have learned fully to appreciate the value of the organic mulch as an important factor in the permanent health and productivity of their trees. Its efficiency naturally depends on the frequency of renewal, and where green crops cannot be successfully grown in the orchard to produce the necessary quantity it has often been found practical to utilize waste areas adjoining in the growing of grasses and such material as can be easily brought in for the purpose. Where such conditions are maintained the addition of mineral fertilizers (phosphates and potash) is much more likely to be profitable. Finally, while clean cultivation cannot be regarded with favour, every effort should be made to prevent the formation of turf in the orchard, to which the roots of most citrus trees are intolerant.

The pruning of citrus does not assume the same importance as is the practice with many other fruit trees, the early stages of growth requiring most attention in regard to this operation; that is, the time when the general shape of the tree is being considered—whether a high or low-headed type is the object in view. While extremes in either direction are to be avoided, low-headed trees possess. economically speaking many advantages over tall trees. These points are succinctly discussed in a short chapter of the book under review.

Handling the citrus crop, as is natural to expect in a work of this kind, receives fairly complete treatment; and while there is nothing new to note under such topics as picking and picking equipment we would commend for study, particularly by those new to the subject, the pages dealing with packing and handling—washing, drying, grading, and colouring—at the packing houses. An important change has been the disappearance of the small individual packing house and the development of larger plants, resulting in standardization of methods and greater uniformity in the final product.

The old plan of sweating or curing oranges and grape-fruit has been abandoned, the fruit being handled now as rapidly as possible; the only curing the fruit may receive occurs during temporary stoppages or in transit. The bulge pack has been evolved to make good any slackness from curing shrinkage after packing. When finished, the fruit in a well-packed box is practically level at the ends, but at the centre it is sometimes up one to one and one-half inches above the sides of the box, even two and one-half inches being permissible. In getting this bulge, advantage is taken of a slight variation in sizing the fruit, the larger fruits being worked towards the centre of the box.

Four chapters on pests and diseases with methods of control in practice complete the book. The reviewer has not thought it necessary to refer in detail to irrigation and frost considerations, both of which subjects find a place in its pages. The volume is efficiently illustrated and well-printed and is assured of a prominent place on the bookshelves of all those interested in citrus culture.

J. SYDNEY DASH.

CENTRAL AND EASTERN AFRICA.

Commission to investigate possibilities of closer union.

THE British Government announces that as a result of the discussions at the recent Colonial Conference in London some form of closer union between territories of Central and Eastern Africa appears desirable, more particularly in regard to the development of transport and communications, Customs tariffs and Customs administration, scientific research, and defence. A special commission is, therefore, to be sent to Africa with the following terms of reference:

First, to make recommendations as to whether either by federation or some other form of closer union, more effective co-operation between the different Governments may be secured.

Secondly, to consider which territories could be brought within any such closer union.

Thirdly, to make recommendations in regard to possible changes in the powers and the composition of the various Legislative Councils of the several territories, both as a result of federation and as a means of associating immigrants, and ultimately natives, in the work of Government.

Fourthly, to suggest the best means of securing thecomplementary political development of native and non-native communities.

Fifthly, to recommend the improvements in internal communications necessary to closer union and,

Sixthly, to consider the finance of federation.

MYCOLOGICAL NOTE.

Rhizoctonia bataticola (Taub.) Butl.

SOME very interesting articles have recently been published by W. Small, M.B.E., M.A., B.SC., PH.D., F.L.S., concerning the occurrence of *R. bataticola* in Ceylon. (*The Tropical Agriculturist*, Vol. LXVII, No. 6, Dec. 1926, Vol. LXVIII, No. 2, February, 1927, Vol. LXVIII, No. 4, April, 1927.)

The author states that the complete list of host plants of this fungus now numbers about thirty including tea, rubber, cacao, coffee, beans, dadap, *Albizzia, Acacia, Grevillea, Tephrosia, Clitoria*, soursop, custard apple, chillies, tomato, lime, orange, plantains and several other ornamental and useful trees and plants.

The well-known root-rots of plants in the East, previously thought to be caused by various fungi such as *Fomes lignosus, Fomes lamaoensis, Ustulina, Poria, Rosellinia, Diplodia*, &c., are now found to be always preceded by *Rhizoctonia bataticola*. Furthermore, cases have been found where *R. bataticola* alone has been present. As the result of extensive observations on root-rot in different hosts on different types of soil the author has come to the conclusion that *Fomes, Poria, Rosellinia*, &c., are followers of the more active parasite *R. bataticola*. In connection with "Die-back" disease, the author makes the following statement in his most recent paper to hand :—"I should like to add to what I have said concerning root disease caused by *Rhizoctonia bataticola* and its followers that I have found lately that certain fungi which occur on the aerial parts of certain plants may be regarded in the same light as the secondary root fungi mentioned. *Diplodia* die-back of rubber, for example, has been found in all recent cases to be accompanied by *Rhizoctonia* root disease. In other words, it is conceivable that the *Diplodia* die-back is nothing more or less than a symptom of the presence of root disease underground, the *Diplodia* fungus which is only a weak parasite being unable to cause a die-back unless the tree is in failing health from another cause. Similarly, the common die-back and gumming of lime trees may be attributed to *Rhizoctonia* root disease, and so also may the gumming of *Acacia, Grevillea* and other stems. Die-back of the aerial parts of a tree is to be regarded on the whole, as a symptom of other trouble, most probably of root disease, and I am not prepared to believe in an independent fungus cause of die-back of local woody plants unless I am convinced that root disease is not present, especially *Rhizoctonia bataticola* root disease. The fact that die-back fungi are often found to be only weak or wound parasites supports this view. These remarks apply particularly to Ceylon, but I shall not be surprised if they prove to have a much wider application. There are many countries in which I personally have no doubt that *Rhizoctonia bataticola* is present and undetected on such crops as tea, rubber, cacao and citrus, and I think it is only a question of time and investigation until the fungus is run to earth, so to speak, and until its suspected great economic importance is realised in full."

Mention is also made of the pycnidial (*Macrophomo*) stages of the fungus *Rhizoctonia bataticola* found elsewhere on Jute, beans and *Sesamum*.

The findings of the author of the articles alluded to are of immense importance, and work which is being carried out at the Imperial College of Tropical Agriculture tends to support his views in some respects and to question them in others. Up to the present the points of interest are :—

I. "Die-back."

Microscopical and cultural studies of organisms occurring on branches of Rubber, Camphor, *Gliricidia* and Cacao suffering from "Die-back" has revealed the fact that in the West Indies, the fungus *Diplodia* is not the first organism to invade the tissues of the branches. In all four cases a species of *Phomopsis* has been isolated which in culture is very like the conidial stage of *Diaporthe perniciosa*. The latter fungus is well known in association with "Die-back" in fruit trees in England. Without going into the extensive bibliography on "Die-back" disease in general, it has been accepted in the West Indies that the fungus *Diplodia* is secondary in importance and follows a physiological check due to one or more causes. The fact that the fungus *Phomopsis* sp. has recently been found to be the forerunner of *Diplodia* does not affect the practical issue except that it makes "Die-back" of Cacao, Rubber and Camphor in the West Indies similar to "Die-back" in England. *Diaporthe perniciosa* according to the writer's view is also secondary and follows a check due to various factors. It would be interesting therefore, to learn whether the fungus *Diplodia* in "Die-back" in Ceylon is preceded by *Phomopsis*. Whether the underground cause is always *R. bataticola* in Ceylon the writer is not in a position to express an opinion, but it certainly is not in England. "Die-back" in England is primarily caused by various factors including : (i) Excessive soil moisture due to lack of drainage. (ii) Potash deficiency of the soil. (iii) Following infection by *Stereum purpureum*. (iv) Following root-rot caused by *Armillaria mellea*. One or more of these render the plants liable to infection by *Diaporthe perniciosa*. Dozens of root systems were critically examined and cultures made but in no case was *R. bataticola* found. Incidentally, the writer's experience with *R. bataticola* on cotton in Egypt and in Trinidad indicates that even this fungus requires special conditions before it can cause root-rot in cotton.

II. Pycnidial Stage of R. bataticola.

Both Shaw in India and Sawada in Japan have found the pycnidial stage of *R. bataticola* on Jute. It is known as *Macrophoma corchori*. In a letter to Ashby at the Imperial Bureau of Mycology the writer stated that he intended carrying out experiments to see if *R. bataticola* from cotton in

Trinidad would also produce the Macrophoma stage. In answer Ashby very kindly sent the following cultures of *R. bataticola* for the same purpose :—

(i) A monospore isolation from a pycnidium on *Sesamum indicum* (Uganda) (ii) a monospore isolation from bean stem (South Carolina) (iii) a culture from sclerotia in the cortex of a lime root (Ceylon) and (iv) a recent isolation from a sweet potato sent to the Bureau nearly four years ago by Taubenhaus as a typical case of charcoal rot in U.S.A. Unfortunately isolations (i) from *Sesamum* was found on arrival to be contaminated but as the result of inoculation and severe wounding of jute stems the isolations from Bean (S. Carolina), Lime (Ceylon), Sweet Potato (U.S.A.), and Cotton (Trinidad) all produced *Macrophoma pycnidia*. Growths from the *Macrophoma conidia* all yielded cultures of the *Rhizoctonia* form.

III.

Infection experiments with *R. bataticola* (=*Macrophoma* spp.) isolated from Cotton in Trinidad have so far failed to reproduce the disease on cotton. Work is being continued with a view to findings the condition under which infection takes place in the cotton plant.

IV.

Whilst being prepared to accept Small's view that *Fomes, Poria, Ustulina,* &c., are secondary in importance as compared with *Rhizoctonia bataticola,* the writer cannot, in view of the failure of infection experiments with the latter fungus on Cotton in India and Egypt, and on both cotton and jute in Trinidad, accept Small's conclusion, namely, that there is no doubt that *Rhizoctonia* root disease will always occur when the fungus is in the soil. The fungus is surely in the soil in infection experiments and it has failed to cause disease on several occasions. It follows, therefore, that infection by *Rhizoctonia bataticola* is dependent on special conditions and from a control point of view must therefore be itself considered secondary. If this is not the case why does Small make the following statements: (i) " As the actual factors which govern susceptibility to the attack of the fungus are not known, it is difficult to give advice of scientific value on means of increasing the resistance of plants exposed to the fungus in the soil." (ii) " Meanwhile, the only measure that can be recommended to the practical planter is that he should promote the health of his plants by all means in his power."

These two last statements are in contradiction to the first, namely, that *Rhizoctonia* root disease will always occur when the fungus is in the soil.

V.

As the result of the severe wounding of the jute stems referred to above, the fungus grew up and down the whole length of the stem and invaded the roots. At the termination of the experiment the two control plants, which were growing in the same pot as those inoculated with the isolation from Bean (S. Carolina), were abandoned and died from drought. Later, it was found that the stem tissues were ramified by the mycelium which produced numerous sclerotia and pycnidia of the *Macrophoma* type were produced in numbers. On culturing these conidia they produced the *Rhizoctonia* form. One might consider this an infection before the plant died of drought and is a point which suggests a possible line in considering the conditions necessary for infection. That is, it may infect through dead rootlets killed by some other factor. Many comparable cases of such abandoned plants are to be found in field crops like Beans, Jute, &c., when the crop is over.

Small considers it is important to know whether the pycnidial stage may occur on the aerial parts of plants which have not been attacked by *Rhizoctonia* root disease, since the focus of attention may have to be moved from the root-rotting soil *Rhizoctonia* to the aerial pycnidial fungus which serves as a source of soil infection. The writer does not consider this of great economic importance because (i) Spores are carried considerable distances on the wind and by means of other agents including, incidentally, those human beings who seek to destroy them. The cost of this would be prohibitive particularly in the case of crops like Cacao, Rubber, or even Beans bordering jungle. (ii) Since the fungus requires special conditions for infection, the main line of control is obviously to eliminate the predisposing factor or factors.

VI.

The recent outbreak of Red root disease of Limes in Dominica provides an opportunity to search for *R. bataticola* in conjunction with *Sphaerostilbe.* The writer hopes to be able to say something definite concerning this in a month or so from now.

VII.

One of the most common fungi to be found in Trinidad is *Fomes lignosus.* Its fructifications can be found on the trunks and stumps of felled or fallen Castilloa Rubber and Immortelle trees in Cacao plantations all over the island. The brackets of the fungus can also be found in large numbers on the sides of drains. *Fomes lignosus* is considered in different parts of the tropics to be the cause of root disease in Rubber and Cacao. The conditions in Trinidad seem ideal for infection of Cacao, and although the writer has watched it closely in some cases, no sign of root trouble has developed. Furthermore, none of the mycologists who have worked in the West Indies have recorded it as causing disease. It is possible, of course, that the Trinidad fungus is a non-parasitic strain of *Fomes lignosus.* On the other hand, the reason may be something similar to what has been found by Small in Ceylon, although *Rosellinia* Root Rot is well known in these islands and Small puts this in the same category as *F. lignosus.*

This note is written in response to Small's invitation to discuss the matter.

H. R. BRITTON-JONES.

LAND CRABS.

Their Destruction in British Honduras.

JOHN H. PEACH.
Chief Sanitary Inspector.

THANKS are due to Sir Arthur Shipley for having the species of land crab of British Honduras determined. We now know that it belongs to the species *Cardisona gunhami*. According to Dr. Borrodaile, Lecturer on Zoology Cambridge University the species is a typical example of a cirum-tropical land crab and it occurs all round the world between the tropics, in tropical America, West and East Africa and throughout the Indo-Pacific region. Readers in the West Indies and British Guiana will readily recognise this pest in British Honduras by the local names of Blue Crab and Bundari crab. I have seen it in Trinidad especially in disused cemeteries, in Barbados along the lowlying parts of the coast and in British Guiana from the mouth of the Corentyn to the mouth of the Barina, where I have seen them march during the month of August by the thousands, all going to the sea. The habits of this land crab, both in British Guiana and British Honduras seem to be the same, as is also the month of marching. From my observations, extending over a period of five years, their pairing or marching season starts about the middle of August, but this year marching started on the 29th August. Thousands came from the swamps and bush at the back of the town and made their way to the sea. This is mainly done at night and nothing prevents them from reaching their objective but death and that accounts for a heavy toll as, on their first appearance, hundreds of persons of all ages go out with bags and lanterns from dusk to dawn to catch them for food. They are made into a very palatable soup or gumbo.

When going to the sea, they are of a beautiful blue colour and there is no sign of eggs. The theory is that they go to the sea to mate and there is no evidence to discredit this. This year the retreat started on the 19th September and thousands came back covering the ground with their hateful presence. On this occasion, very few males were to be found. The females were loaded with eggs and were not the beautiful blue shade they were when going to the sea. Instead, they looked pale and anaemic. Their movements were sluggish and this accounted for the numbers found dead on the streets during the mornings as small boys with sticks take a delight vying with each other in seeing how many each could kill. Of course, a great many get back to the swamp where their eggs are deposited. This is repeated year after year, but what the period of their life cycle is, I am unable to say. Many of these crabs especially the males, burrow whenever they possibly can and these burrows become not only the hiding places for mosquitoes, but also the breeding places especially in the dry season. To prevent this, a campaign was started by the Central Board of Health against these crabs with "Cyanogas" Knapsack Sprayers made by the Cyanogas makers, were used. This had to be done during the dry weather on account of the near proximity of the subsoil water to the surface. It was found that not more than 10% of the holes previously treated were reopened by next morning and in a good many instances, dead crabs were found a couple of yards away from these holes. The campaign has been very successful and the cost small, about a cent per hole. The following is the method adopted.

An Inspector is given one boy with a Knapsack Sprayer filed with about five pounds of Cyanogas. The nozzle is inserted in a crab hole and the Cyanogas pumped in. About eight puffs are given to each hole. The nozzle is withdrawn and the hole covered by another boy with a "machete." Two boys for covering the holes are alloted to each boy with a sprayer and are kept busy. To be sure that every bit of ground is attended to, each area is pegged off in smaller areas by means of red flags in squares of about 20 feet. Cyanogas seems to be the ideal poison for crab control and would eventually be the means of ridding any area of these pests, provided all their lairs can be got at but many of them take refuge in the dense mangrove swamps and there enjoy a peaceful life.

ROYAL COLONIAL INSTITUTE.

Grants for Empire Research.

THE Council of the Royal Colonial Institute have resolved to set aside a small sum annually from the funds of the Institute to facilitate the publication of original monographs embodying the results of research relating to the British Empire oversea.

Monographs must deal with any appropriate thing whether in political, natural or economic science, or in the field of literature, relating to the British Empire oversea or some associated subject. No rigid limits are set, but 40,000 to 60,000 words are suggested. Although there is no limitation of method of treatment, the monographs most likely to secure grants are those which will make an appeal to the general reader. Successful works will be published on the "Imperial Studies Series" the object of which is to enable the younger people who have found difficulty in making their investigations known to get their early efforts published.

Save in exceptional cases, candidates must not be more than 30 years of age on 31st December of the year of application. The next allocation of grants will be made about the end of January, 1928. The work submitted, should be addressed to the Secretary of the Royal Colonial Institute, Northumberland Avenue, London, W.C.2, and should reach the Institute before 31st October, 1927.

TROPICAL WORLD NOTES.

The Sudan.

In view of the fact that the Sennar Dam on the Blue Nile had been working for a sufficient time to test its solidity and durability—for, although it was officially inaugurated only in January, 1926, it was actually put in operation in July, 1925—the Sudan Government arranged that Mr. O. L. Prowde, C.M.G., M.I.C.E., who was the resident engineer, and retired on its completion, should come out this winter to examine it. After an exhaustive investigation lasting six weeks; Mr. Prowde has now reported that the dam is in excellent condition, and that the whole structure has stood the initial strain most satisfactorily. At the same time, Mr. Prowde recommends some additional work in connection with the sluices. Of the eighty sluices, seventeen so far have not been utilised, owing to the foundation rock being at a high level, and consequently likely to be eroded below the dam. He suggests that down-stream from these seventeen sluices masonry aprons should be constructed, which will enable them to be used with perfect safety at all times. The Sudan Government is now considering his recommendations.—*Times.*

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Jamaica.

The Legislative Council has presented a report to the House on the sources from which capital should be derived for the establishment of a State agricultural bank in Jamaica, and also the scope of the bank's operations. The committee recommends that moneys deposited in the Island Treasury under the Emigrants Protection Law should be utilized to assist in developing the agricultural resources of the country. This step, it is pointed out, would result in reducing the number of persons who are forced to leave Jamaica in search of employment. The sum of £100,000 from the amount at credit of emigrants' deposits should be set aside for the starting of the bank. The latter should be empowered to issue shares of £1 each, transferable and bearing interest at 5% per annum, such shares being offered to the public.

The bank should have power to—

(*a*) assist applicants in the purchase of lands to be used for the cultivation of permanent crops;
(*b*) enable applicants to discharge liabilities due on their lands, stock machinery, &c.;
(*c*) effect improvements;
(*d*) afford relief in periods of stress.

It is suggested that all agricultural loan societies fostered by the Island Government should be merged into the wider institution, which should be managed by a board of directors appointed by the Government. The Council will in due course consider the report.—(*The Times Trade and Engineering Supplement*, No. 458, Vol. XX, p. 100.)

British Honduras.

At the opening of the 1927 Session of the Legislative Council of British Honduras the Governor of the Colony referred to the wonderful progress that has been made in the trade of the country during recent years. Imports have advanced from $1,610,000 in 1922 to $3,900,000 in 1926, while exports have risen from $2,800,000 to $3,900,000. The young grapefruit industry, the Governor went on to state, had done well in the past year, fruit to the value of nearly $11,000 having been exported. The arrival of an agricultural officer to take charge of agricultural matters, particularly the co-operative marketing scheme and fruit-growing in general, was anxiously awaited. The Empire Marketing Board was taking great interest in this line of development, and the Governor hoped that the Board would make a substantial grant towards its advancement. —(*The Times Trade and Engineering Supplement*, No. 458, Vol. XX, p. 100.)

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Bolivia.

The Bolivian Government, according to a message from La Paz, has granted a new subsidy of 200,000 bolivianos (£14,583) to the company working the commercial air services between Cochabamba and Santa Cruz. A regular aeroplane service between these two towns has been in existence since 1925, and is supported by an annual subsidy of 70,000 bolivianos (£5,102). The journey of 250 miles, which ordinarily takes a fortnight by mule, is covered daily by aeroplane in 3½ hours. The new subsidy is to be taken from the proceeds of the loan of $14,000,000 (£2,800,000), which was issued recently in New York to finance the construction of a railway between Cochabamba and Santa Cruz. The projected establishment of four new air services to open up extensive areas in East Bolivia was announced a short time ago, and the granting of the new subsidy is regarded as the prelude to a government programme of progressive aerial expansion.—(*The Chamber of Commerce Journal*, Vol. LIII, p. 305.)

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India.

The final general memorandum on the cotton crops of India for the 1926-27 season has been issued. It is based on reports received from all the Provinces and States and refers to the entire cotton area of India. It deals with the final reports on both early and late crops of the season for all tracts except Madras. The total area reported is 25,006,000 areas, as against 28,491,000 areas, the revised estimate of last year, a decrease of 12%. The estimated yield is 4,952,000 bales (revised) last year, a decrease of 21%. The condition of the crops on the whole is reported to be only fair. Of the total yield Oomras represent 46%, Bengal-Sind 17%, Dholleras 10%, American 5%, Broach and Coompa Dhawars 4% each, Westerns and Northerns and Tinnivellys 3% each, and Cambodia 2%.

Peru.

An interesting and instructive account of present day economic conditions in Peru is given in the latest report of Mr. J. P. Trant, H.M. Consul at Callao. With the rights of property guaranteed, and respect for those rights enforced, public confidence has been restored, and the nation has rallied to the support of the Government in the realization of its constructive programme. New highways have been built, new buildings erected, new mines and oil wells opened up, new irrigation works, and new railways commenced, new industries started, and at the same time agriculture has been stimulated, national defence improved, and the health and general well-being of the people provided for by new sanitation works in most of the principal cities. Yet these improvements have not been brought without considerable cost, and there are many who think that they have been undertaken on too great a scale in proportion to the wealth of the nation. The public debt has more than doubled in the last five years, and indirect taxes, either in the form of import dues or consumption duties, bear heavily on the people. During the whole of this period the interior of the country was cut off from all communication with the coast, and, consequently, for a long time export of minerals and agricultural products was interrupted. Following this came a gradual slump in the price of cotton and sugar, the two staple crops, which has now reached a point where prices no longer pay for the cost of production. As a result, exchange is demoralized, credit curtailed, and money extremely tight, and it is certain that if it were not for the large loans that the Government has recently succeeded in making for the prosecution of public works, there would now exist a general paralysis of industry.—*Chamber of Commerce Journal*, Vol. LIII, No. 687, p. 368.)

* * *

Sierra Leone.

"Correspondence Relating to a General Survey of Disease in the Protectorate of Sierra Leone" is published as Sessional Paper No. 4 of 1927. Dr. B. Blacklock's proposals for a survey of disease have been approved by the Secretary of State. The aim of the survey would be to obtain accurate figures of the incidence of the known diseases, *e.g.*, malaria, yaws, syphilis, trypanosomiasis, tuberculosis, over the country as a whole. This would be done by a process of thorough examination of chosen samples of the population at various points in each district. The survey would not concern itself primarily with research into individual diseases, nor with the treatment of disease, although the latter must always be undertaken to a certain extent. In cases where research was required into already known diseases, or into newly discovered diseases, the matter would be referred for investigation in co-operation with the staff at the laboratory in Freetown. —(*African World*, Vol. XCIX, p. 67.)

Ceylon.

The announcement was recently made that Sir Herbert James Stanley, K.C.M.G., Governor of Northern Rhodesia, had been appointed Governor and Commander-in-Chief of Ceylon, in succession to Sir Hugh Clifford, G.C.M.G., Governor of Ceylon, who has been appointed Governor and Commander-in-Chief of the Straits Settlements, and High Commissioner of the Malay States in succession to Sir Laurence Guillemard, G.C.M.G., K.C.B., who will shortly complete his term of office.

Sir Herbert Stanley, who is in his fifty-fifth year, was educated at Eton and Balliol College, Oxford, and began his official career as Private Secretary to the British Minister at Dresden and Coburg (1897-1902). From 1906 to 1908 he acted as Assistant Private Secretary to the First Lord of the Admiralty, and then for another two years to the Lord President of the Council. From 1910 to 1913 he served Lord Gladstone as Private Secretary during his period as first Governor-General of the Union of South Africa, followed by two years as Official Secretary. He was Resident Commissioner in Rhodesia from 1915 to 1918, and then for six years Imperial Secretary in South Africa.—(*The African World*, Vol. XCVIII, p. 360.)

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Tanganyika.

According to a cable circulated by the East African Information Office, exports of sisal from Tanganyika Territory last year amounted to 25,022 tons, compared with 18,276 tons in 1925, an increase of 39 per cent. The best previous figure was 20,834 tons in 1913, the last complete pre-war year, so that the Tanganyika sisal industry has now more than regained the position it had attained in the days of German rule, and has established a new record 20 per cent. better than that of any previous year. It would seem that the labour supply has much improved. Another factor which has contributed to the greater output is the maturing of large areas planted about five years ago. The sisal plant requires four or five years to reach the stage of development at which the cutting of leaves can be begun. The result of the replanting undertaken by the present owners of the older estates, to make good the indiscriminate cutting done by temporary lessees immediately after the Armistice, is now making itself felt. A number of new estates will reach the production stage shortly, so that given a continuance of favourable conditions, a steady growth of the quantity of fibre and tow exported may be anticipated for some time to come. It seems not unlikely that East Africa will eventually challenge the dominating position at present held by Mexico as a producer of hard fibre.—(*The Times Trade and Engineering Supplement*, Vol. XX, p. 4.)

Readers are requested to inform the Editor immediately of any change in address.

NIGERIA.

West African Agricultural Conference.

THE first Agricultural Conference of the British West African Colonies was held at Ibadan, Nigeria in March, and was attended by delegates from the agricultural departments of Sierra Leone, Gold Coast and Nigeria. Eleven papers were read, the range of subjects including the Oil Palm, Cocoa, Produce Inspection, Green Manuring, Soil Surveys, and the Entomological and Mycological problems of the several Colonies. An important discussion followed a paper on the Oil Palm Industry of the East, presented conjointly by Messrs. Auchinleck and Waters, delegates from the Gold Coast and Nigeria, respectively. These two officers had recently returned form a tour of the Sumatran and Malayan plantations, and it was indeed refreshing, after the bewildering mass of opinions with which the West African press has of late years been deluged, to receive, at last, authoritative statements on the burning question of the "Eastern Menace." It appears that the Eastern plantations can, and do produce Oil Palm fruit at a figure at which no factory in West Africa could hope to secure a constant supply from natives, under the existing system of the harvesting of "wild" palms. Nevertheless the opinions of the other delegates were divided over the effect of the growing exports from the East on the West African trade, for much depends on factors, such as the World demand of the future, which are matters for conjecture. It was mentioned that the Kernel trade is not menaced to the same extent as is that of Palm Oil.

At the close of the conference, several resolutions to the Governments were passed. These included provision for triennial conferences, each Colony in turn acting as host, and the establishment in Nigeria of a Central West African Agricultural College.

Cotton.

It was feared that the current low prices would have a disastrous effect on that hitherto lusty infant, the American cotton growing industry of Northern Nigeria. By substantial remissions in railway and steamer freights by the Nigerian Government and Messrs. Elder Dempster and Co., respectively, and by a reduction of the ginning charges by the British Cotton-Growing Association, it was possible to bolster the price offered for seed cotton to ¼*d.* per lb. above the current economic value. The belief that the present slump would be of short duration, and the healthy progress made by cotton cultivation in the past, appear to justify this temporary subsidy. It is estimated that the American cotton exports will be about 17,000 bales this year, which is less than half that which might normally be expected. However, the drop is assigned more to a disastrous season than to the low prices now ruling, and it is confidently anticipated that this check in the export trade will prove of short duration. In the South, an exceptionally good season promises to maintain the cotton exports at the average figure of 10,000 bales in spite of the slump, and it is estimated that perhaps twice this amount might have been exported had it been possible to offer a normal price. Here the farmers have a choice between the export and local markets and the latter have, on the whole, proved the more attractive this year.

The efforts of the Agricultural Department in isolating an improved strain of indigenous cotton for Southern Nigeria have been successful, and a cotton of unprecedented value on the West Coast has been produced. This cotton is of a type vegetatively suited to the native agricultural system and its yield is satisfactory. About one ton of seed is available for small scale distribution during the coming season. There is every reason for believing that this cotton will revolutionize the industry in Southern Nigeria when once the initial difficulties of extension work have been overcome.

The Nigerian Railway.

On 1st April, the newly completed Eastern Railway was opened to ordinary traffic. This line, which has been under construction for some years, now connects Port Harcourt the chief port of the Niger delta, with Kaduna on the Lagos-Kano line. Thus there are now two outlets for the produce of the north. This will be particularly useful in evacuating the ground-nut crop, which, owing to lack of sufficient transport has frequently accumulated at Kano in past years. In addition, a large area has been opened up, which has hitherto been unproductive as far as export trade is concerned, and the coal mines at Udi on the Southern portion of the Eastern line are now in direct communication with all parts of the Nigerian Railway system.

C. J. L.

EMPIRE MARKETING BOARD.

THE Empire Marketing Board have established an office in Liverpool for the purpose of carrying out various lines of research work recommended by the Imperial Economic Committee in their Fruit Report. During the season their technical specialist has carried on careful inspections of Canadian fruit arrivals, with a view to ascertaining the facts as to condition and its cause. The work during the past season has been only preliminary, but it is hoped next season that, it will be possible to undertake some experimental research work into the causes of slack packs, and of all conditions of unsoundness and deterioration, that should prove of the greatest value to our shippers. The Marketing Board are also issuing a circular of Fruit Intelligence, which collates and sets forth much interesting information with regard to quantites of fruit shipped, stocks in storage, &c.

AGRICULTURAL ECONOMICS.

The Research Institute, University of Oxford.

To a recent issue of the *Journal of the Ministry of Agriculture*, Mr. C. S. Orwin, contributes an article on the Agricultural Economics Research Institute of the University of Oxford. The institute was established in 1913 as a result of the University's application to the Ministry of Agriculture for a grant in aid of economic research in agriculture.

The study of the structure of the agricultural industry and of the organization of the farm is a comparatively recent development of modern agricultural research. In its earlier stages the investigation of the farmer's problems was limited to matters arising out of the application of the physical and biological sciences to the production of crops and to the breeding and feeding of live stock; and the setting up of the Institute in 1913 marks the realization of the fact that the study of economics can serve the farming community in many important ways. One of the hardest facts that experience has taught about agriculture is that "good" farming, *i.e.*, the generous application of capital and labour to the business of production from the land, is not necessarily synonymous with "successful" farming. What the farmer needs, therefore, is the means to reduce to a minimum the economic uncertainty inherent in his business, and this can only be provided by a systematic study of the industry in all its aspects.

Dealing with the work of the Institute, the Director states that the first approach to the study of farm management problems was made by means of costing. Costing is, of course, only the means; it is not the end itself. Moreover, it is only one means by which to examine farm organization. A good deal of pioneer work was needed to secure the interest and co-operation of farmers, and there was also much to be done towards the definition of principles and the evolution of methods which called for experimental work in agricultural costing as a preliminary to research.

It was recognised that the costing method was the first line to attack on the problems of agricultural economics, but it was also realised that it would not be sufficient in itself and that valuable information could be collected by means of economic surveys. The evidence to be got in this way would be less complete than that furnished by the more intensive costing method; on the other hand, a much greater mass of it could be collected by the expenditure of an equal amount of time and energy. At the outset these surveys were planned to deal with particular problems, such as allotments and small holdings and the prevailing systems of farm management. This method, however, was found to be incomplete, for, although it must happen that special problems will arise for investigation, the study of farm economics as a whole cannot best be pursued by the examination of particular questions. Thus it was decided to inaugurate general surveys, designed to collect information of every kind which could be got by inquiry on the farm, to tabulate this in a variety of ways, and then to study the tables in order to see what information they afforded. The method has been made familiar by the work of American farm economists. Then came the interruption of the war, and although the work never stopped entirely, it was continued under conditions of difficulty and in a much restricted form.

In 1919 additional financial provision was forthcoming and the experience gained by the Institute in its earlier years opened a clearer view, both of the problems to be attacked and of the methods of approach. Work was developed upon the lines both of the costing and the survey methods, and other inquiries subsidiary to this were also undertaken.

The work now in progress is summarized under the following heads:

(*a*) Farm Management Studies.
(*b*) Rural Life Studies.
(*c*) Miscellaneous Studies.
(*d*) Work in the Advisory Province of Oxfordshire and Northamptonshire.
(*e*) Education.

Farm Management Studies.

These are carried on by personal investigation amongst farmers, whose co-operation in the work is essential. The methods of study may be distinguished as follows:—

(1) Costing.
(2) Analysis of financial accounts.
(3) Surveys (*a*) directed towards the investigation of the whole business of the farm; (*b*) dealing only with individual products or particular problems.

About 75 farms are being studied by the first and second methods, including 28 farms representing some 12,000 acres which are fully costed. The surveys made embrace about 900 farms of different types in different districts.

Particular attention is being given to the sugar beet problem and to the question of the marketing of farm products. An important study of the Law of Diminishing Returns is now nearly completed, and other studies are in hand.

Rural Life Studies.

These, so far, have been limited to a survey of the Rural Industries of England and Wales. The function and place of local industries in rural life cannot be overlooked in any consideration of the development of the countryside, and this survey was undertaken to throw some light upon the question of the survival of village crafts in a highly industrial country.

Miscellaneous Studies.

Perhaps the most noteworthy work in this division completed so far is the Agricultural Atlas of England and Wales. Other investigations now in progress include an inquiry into the incidence and extent of unemployment in agriculture and the problem of live-stock insurance.

Work in the Advisory Province of Oxfordshire and Northamptonshire.

The Institute undertakes advisory work in farm economics in this province. The main activities are concerned with costing and financial accounts, and advisory and organization work in connexion with the marketing of farm produce is being developed. In co-operation with the Agricultural Organizers of the two counties, lectures, both single and in the form of short courses, are arranged from time to time.

Education.

Work of a more directly educational character is undertaken by the Institute through the supervision and instruction of post-graduate students holding scholarships from the Colonial Office, the Ministry of Agriculture and Fisheries, and the Board of Agriculture for Scotland. The scholarships differ in character, and in the length of tenure; some of the scholars become members of the University and engage in definite research work, whilst others remain for a shorter period and receive a course of training in the methods of approach to the study of the economic problems of agriculture. Public lectures to farmers' clubs, village clubs, and similar organizations are delivered by various members of the Institute staff from time to time.

The above extracts are reprinted as a welcome indication of the increasing recognition of the importance attached to economic research in relation to agriculture. Economic research in the tropics presents almost a virgin field and there are signs that its importance is at length beginning to be recognised.

C.Y.S.

BOOKS RECEIVED.

WE have to acknowledge the receipt of the following books:—

Fertilizers for South African Fruits. pp. 64. Chilean Nitrate Committee.

Year-book of Agricultural Statistics. pp. 558. Rome. Imperial Institute of Agriculture.

Cotton Futures. Charles Stewart. pp. 20. Liverpool. The Author. 1s.

Allgemeine Bodenkarte Europas. Der Unterkommission fur die Bodenkarte Europas bei der V. Kommission der Internationalen Bodenkundlichen Gesellschaft. Prof. Dr. Stremme-Danzig. pp. 28. Internationale Bodenkunliche Gesellschaft, Dantzig, 1927.

Sugar Beet. A. Bridges & R. N. Dixey. pp. 72. Ministry of Agriculture and Fisheries. H.M.S.O., 1s.

The value of Beef Protein as a supplement to the proteins in certain vegetable products. Hoagland, R. & Snider, G.G. pp. 297-308. Washington, U.S. Dept. of Agriculture.

INSECT CONTROL IN HAWAII.

(*Continued.*)

Other insect Pests.

Wireworms.—Wireworms, especially *Monocrepidius exul* Shp. and *Simodactylus cimameus* (Boisd.) are perennial enemies of sugar-cane, and notwithstanding persistent searches made for parasites, no effective enemies have so far been secured. Mention should be made of the work of F. X. Williams in the Philippines, Panama, Ecuador, Brazil, and British Guiana; of Pemberton in Fiji and Queensland and of H. T. Osborn in Mexico. Although these efforts were unsuccessful in so far as wireworm enemies are concerned, they resulted in the collection of useful information relative to sugar cane insects and other conditions in the countries visited.

The Horn Fly.—This insect is a most persistent and troublesome enemy of livestock. Attempts so far made by the introduction of other species of insects to enter into competition with it have not led to any noticeable degree of restraint. The insects introduced included not only predators and parasites but also coprophilous forms, various species being obtained, mainly through Koebele's efforts, from Mexico, Arizona, Australia and Germany. Among the few that succeeded in maintaining themselves was the Cynipid *Eucoila impatiens* Say, an Arizona parasite of Dipterous larvae in cow dung. The problem of the control of the horn fly is still under consideration and it has been suggested that Africa is the most promising land to look to in future for parasites. In addition to the search for further parasites of the cane borer, wireworms and horn fly, other projects are in hand either by the combined or separate efforts of the H. S. P. A. and the Board of Agriculture and Forestry. These include the control of the pine-apple mealy bug (*Pseudococcus bromeliae*), the so-called Japanese beetle (*Adoretus sinicus*) especially destructive to rose trees and the mole cricket. Problems under discussion, and which will presumably form part of a future programme, include the control of the cane aphis, the cane mealy bug (*Pseudococcus sacchari*) and the corn aphis (*Aphis maidis*) which is concerned with the spread of mosaic disease.

Some idea of the vigilance that is needed to preclude the accidental entry of still further pests into the Islands may be gathered from recent reports of the Chief Plant Inspector, Mr. E. H. Ehrhorn. During the biennial period, 1st January, 1923-31st December 1924, 1,627 vessels entered the ports of the Islands. They carried vegetable matter, subject to inspection, numbering nearly 983,000 packages, while 5,219 postal packages were also examined. The importance of this side of control work is fully recognised by the provision of a well-organised inspection department and the best equipment money can procure.

(*To be concluded.*)

COCOA GRADING.

The Nigerian Ordinance.

The following is an English rendering of an article entitled "Kakao-inspection" which appeared in the "Gordian" 10th Feb., 1927.

THE inspection and grading of produce by officers specially trained for that purpose is important in order to secure and maintain a high standard of produce, particularly of that intended for export.

A good example of increasing appreciation in the world's market after an Inspection Ordinance was brought into force, is afforded by the cacao trade of Nigeria. There the inspection of produce, especially palm kernels, palm oil, and cacao was brought into force by Ordinance No. 29 of 1926, which was printed as a supplement to the *Official Gazette* of Nigeria of 19th August, 1926.

This Ordinance, has, in the short time that it has been in existence, proved to be of considerable value. This is shown by comparing the prices recently paid in Lagos for Nigerian cacao and in Accra for that of the Gold Coast. In the following table the prices are per ton (1016 kilos.), exclusive of bags, export duty, shipping costs and exporters' commissions.

1927.		*Lagos.*	*Accra.*
January	6	£54	£59
Do.	10	58	60
Do.	13	59	61
Do.	17	62	61
Do.	20	59 10*s.*	60
Do.	24	55	54
Do.	27	54	56
Do.	31	53 2*s.* 6*d.*	56

Whereas formerly cacao in Lagos brought £4 a ton less than Accra, lately the prices between the two places have been fairly even, at times the prices in Lagos have been higher than in Accra.

Under the Ordinance the term "Produce" includes palm kernels, palm oil and cacao. Produce which is brought to the Port of Lagos and there reloaded for export is not included as produce exported. The Governor is authorised to appoint a Chief Inspector and such Inspectors and Samplers as may be necessary to carry out the regulations relating to inspecting and grading. For the convenience of exporters arrangements have been made with reference to the places and times of inspection of produce intended for shipment.

The following charges are levied in order to meet the expenses of inspecting: Palm oil 1*s.* per ton (1016 kilos.), Palm kernels 9*d.*, Cacao 2*s.* 6*d.*

Cacao is graded as follows:—

Quality 1 (*Grade* 1) includes cacao that is fully dry and on an average does not contain more than 10 per cent. of mildewed, wormy, spoilt or shrivelled beans.

Quality 2 (*Grade* 2) includes all other dry cacao.

Anyone having fermented cacao intended for shipment from the Port of Lagos can, on application, be given facilities for having the cacao specially inspected by an Inspector or Sampler. If the inspection shows that the cacao is fully dry and contains not more than 1 per cent. mildewed, wormy, or shrivelled beans and not more than 1 per cent. misshapen or unfermented, then the cacao is to be bagged in the presence of an Inspector or Sampler and sealed in the manner directed. This cacao is then designated as Special Grade. For purposes of inspection the cacao is to be spread on tarpaulins so that every single bean can be seen. From every lot for shipment an average sample is to be taken from which the final sample of 20 ozs. is to be drawn. If, after the beans are cut, not more than 10 per cent. of the bean are mildewed, spoiled or shrivelled and if the cacao is fully dry the consignment is to be classified as Quality 1.

If the amount of mildewed, wormy, damaged or shrivelled beans exceeds 10 per cent., and if the cacao is fully dry it is to be classified as Quality 2.

The cacao so inspected and classified is to be bagged in the presence of the Inspector or Sampler and sealed. With certain exceptions mentioned below, no produce is to be shipped from the Port of Lagos that has not been inspected in conformity with the regulations in order to ensure that it conforms to the requirements of the Ordinance. No person is permitted to ship, or attempt to ship any produce that has not been so inspected or classified, under a penalty of £50, or six months' imprisonment, or both. Notwithstanding the foregoing regulations, the Director of Agriculture may grant a license or permit for the shipment of unclassified cacao from the Port of Lagos under conditions stated in the permit and for purposes to be stated therein: for this purpose the nature and quality of the cacao must be accurately described. Every such permit must contain the proviso that the exporter shall give a guarantee on the prescribed form, to be obtained from the Director of Agriculture, that the produce mentioned in the permit, on its arrival at the country of destination, shall not be sold as first or second grade of *Quality* cacao.

Every dealer in produce is required, in respect of every warehouse from which shipments are made, on a specified form, to make an entry on the day of the transaction of all transactions relating to produce dealt with, and to produce this record on demand to any Inspector or Sampler. A penalty of £25 is incurred for a breach of this regulation.

The Inspection Ordinance contains stringent rules, the observance of which, it is anticipated, will be of considerable benefit to the cacao industry. It is to be regretted that there is not an Ordinance for the compulsory inspection of cacao in every producing country.

WE have recently received from Messrs. Martineau & Smith, Birmingham, England, an illustrated booklet describing the Martsmith Spraying Specialties. Messrs. Martineau & Smith are regular advertisers in *Tropical Agriculture.*

SUGAR NOTES.

Compiled by the College Department of Sugar Technology.

Characteristics of a good raw sugar.

In discussing the Refining qualities of raw sugar (*I. S. J.*, Feb. 1927), T. B. Wayne gives the following description of a typical good raw sugar :—

Crystals shall be uniform, hard and sharp, average diameter of not less than 0·6 mm., or over 1.0, preference being given to 0·8 mm. crystals. There shall be few fine or needle-shaped crystals which tend to form dense layers next to the centrifugal basket linings in the washing operation, as well as increase the affination losses. When viewed by projection of their images on a screen (*see* Meade), the crystals should be regular and of good shape. The colour value by spectrophotometric analysis at wave-length of 560 mu. expressed as minus log. specific transmissivity, shall not exceed 0·7500. The spectral absorbtion trend shall conform to the usual standard absorbtion ratios for a bright sugar. With a total colour value of less than 0·7500, the higher the absorbtion trend at 440 mu. the more suitable the sugar is for refining purposes, since this indicates that the colouring matter present is due to caramelization of an incipient nature and the absence of greyish colouring matter indicating improper clarification of ferric iron-polyphenol compounds. A typical caramel trend in a sugar of this type and low total colour content indicates that the sugar was boiled from juices undergoing very complete clarification with a subsequent elimination of a maximum of impurities, yet the clarification was not heavy enough to cause the formation of too much red colouring matter.

Polarization: 96·0° or more, at 20°C.; ash at maximum temperature of 750°F. not exceeding 0·45 per cent.; moisture, as determined by drying in vacuo at 80°C. to constant weight, shall allow the sugar to conform to a safety factor of 0·25. Filtrability: crystal formation indicates how the boiling process was carried out, and if it conforms to the specifications mentioned above, such factors as moisture content, ash percentage, and filtrability, are usually cared for satisfactorily through the reduction of surface films which carry these impurities. If the sugar conforms to the colour specifications mentioned above, this will indicate that the sugar was boiled from the most efficient clarification. Therefore, if the clarification was correct, the juice will contain a minimum of non-settling matter, gums, &c., which affect the filtrability. Consequently, in attempting to grade raw sugars, it appears more logical to have the specifications cover qualities of the raw sugar which are directly influenced by the manufacturing processes of clarification and boiling. In attempting to improve filtrability, the manufacturer must get better results from these processes in order to accomplish the desired improvements, so the grading specifications may as well be based on the characteristics directly determined by these processes, *i.e.*, grain and colour characteristics.

* * *

Empire Sugar Federation.

At a meeting held in London of the Empire Sugar Section of the British Empire Producers' Organisation, which represents the entire sugar-producing industry of the Britsh Empire, it was unanimously decided to constitute the Section into a Federation, the membership of which will include the producers and refiners of the sugar industry and all others interested in the production, transport and marketing of Empire sugar. The objects of the Federation are to promote the interests of the Sugar Industry of the Empire—and to collect information in regard to all matters relating to methods of production, transport and marketing, to carry out a programme of propaganda and publicity with aview to increasing the production, sale and consumption of Empire Sugar, and to obtain such treatment for Empire-produced Sugar as will secure stability, and generally to take such action as may be considered desirable in the interests of the Empire Sugar industry. Mr. Ben H. Morgan was unanimously elected as chairman of the new body.

BARCLAYS BANK.

THE Trade Report by the General Managers of Barclays Bank (Dominion, Colonial and Overseas) in South Africa contains the following information :—*Cotton.*—Reports indicate that many farmers have ceased cotton growing and others have reduced the area under cultivation. *Tobacco.*—Severe drought conditions continue in Oudtshoorn district, where the crop is expected to yield about 2,000,000 lb. against 4,500,000 last year. *Maize.*—Owing to changing conditions growing crop prices have fluctuated considerably, showing a downward tendency. Rains during February had a beneficial effect on late plantings, and the general opinion is that crop will be not far short of normal. *Sugar.*—Rainfall over the Natal sugar belt was well above the average, and cane has considerably benefited. Last year's plantings are still stunted in growth. Latest 1926 to 1927 crop figures indicate yield in neighbourhood of 242,662 tons. Active business points to increased demand in the near future. *Fruit.*—The quantity of deciduous and other fruit exported during January was 301,772 boxes, a decrease of 106,905 boxes as compared with January, 1926. Total exported from November, 1926, 385,910 boxes, equivalent to 4,543 tons. According to the Union 1926 citrus crop return, 624,270 cases were exported. Owing to absence of early rains, Transvaal crop will be less than expected. Californian and Spanish crops are reported to be very short, and there is every probability of big overseas markets for South African citrus fruit during 1927.

CHEMICAL NOTES.

Compiled by the College Department of Chemistry and Soil Science.

Ginger Oil from Rhizome Peelings.

In the preparation of Ginger Oil the whole of the rhizome is generally used, although it is appreciated that the greater part of the volatile oil is contained in the outer rind. Samples of peelings from Sierra Leone obtained during the preparation of dried ginger have therefore been analysed in respect of their oil contents. After being ground finely, they were found to contain 10. per cent. of moisture, and on distillation with steam, 4.0 per cent. of essential oil, or 4.4 per cent. on the moisture free material. This yield is somewhat higher than that usually obtained from ginger cuttings which generally furnish between 2-3 per cent. The product was a pale yellowish brown oil with a fairly good aroma, and the determination of its contents (Sp. gr., acid and ester values, &c.) show that this oil from ginger peelings has all the normal character of oil of ginger.

Extraction with Acetone and removing the solvent by distillation, produced a dark brown, viscous extract with an intensely pungent taste, good aroma and normal properties. The yield amounted to 12.5 per cent.

The two products were of a very satisfactory quality, and favourable reports of these oils from peelings have been received from the United Kingdom where it is expected a good opening will be found for them.—(*Bull. Imp. Inst.* 24, 649-54 (1926.)

* * *

Ethylene Dichloride.

The value of Ethylene dicholoride as a solvent and as raw material for synthetic products though appreciated, has been kept in obeisance by the lower priced carbon tetra-chloride, a substance possessing similar qualifications to ethylene dichloride. Any advantages the latter might possess could not compete wth a difference in price of thirty-five cents per pound. By the use of more refined and more economical methods of manufacture, however, the price of ethylene dichloride has been reduced to six cents per pound thus placing on the market what is practically a new substance and one which will undoubtedly replace many of the present solvents. It is particularly valuable in the extraction of oils from seeds and beans and for the extraction of waxes. As raw material for synthetic processes its reaction with sodium acetate under pressure produces glycol diacetate valuable in the manufacture of artificial silk, while its reaction with ammonia gives ethylene diamine. No doubt many further uses will soon be discovered.—(*Killeffer—Ind. and Eng. Chem.*, Vol. XIX, No. 5 p. 636.)

Vulcanizing Rubber Latex.

The Society of the Netherlands Fisheries Experiment Station, The Hague, Netherlands, has applied for a patent for a process of vulcanizing rubber latex, particularly for the purpose of coating yarns, fabrics, &c. According to the process, more or less unstable sulphur compounds are added to the latex. These compounds give up their sulphur for the vulcanization of the latex when they come in contact with the air (oxygen) while the other decomposition products are volatile. Sulphide of ammonium in which free sulphur is dissolved, organic sulphur compounds like alkylammonium-sulphides, for instance tetramethylammonium-sulphide, also ammonium salts of tetrathioglycolic acid, trithio-allophanic acid, trithio-carbonic acid, &c., may be used. Commercial latex always contains ammonium as anticoagulant so that it can be mixed in almost all proportions with sulphide of ammonium or ammonium-polysulphides. If this mixture is dried in the air, the water and ammonium evaporate in the air and only the sulphur remains in the latex by which vulcanization takes place. Besides the above, vulcanization catalyzers like pyridine, piperidine, &c., may advantageously be added to the latex. This new method of vulcanization is of special importance for preserving yarns, fabrics, &c., because there is no acid present in the vulcanization liquid that can damage the fibre. For saturating nets, for instance, a latex containing 30 to 35 per cent. of pure rubber, to each liter of which is added 150 cc. of an ammoniumpolysulphide solution containing 100-150 gr. of sulphur per liter, is used. Or 100 gr. of trithiocarbonic acid ammoniac to one liter of latex with the same rubber content could be employed. As soon as it is saturated with the liquid, the net is stretched out and dried in the sun as far as possible. Vulcanization takes place simultaneously with the drying, in contrast to a known process (Netherlands Patent No. 11,994) in which materials are treated with latex that has been vulcanized in advance according to any method, for instance by addition of sodiumpolysulphide and heating.—(*India Rubber World*, Vol. LXXVI, p. 118.)

SHIRLEY INSTITUTE.

New Director.

To succeed Dr. A. M. Crossley, the Council of the British Cotton Industry Research Association have appointed Dr. R. H. Pickard, F.R.S., as the Director of Research at Shirley Institute. Dr. Pickard goes again to Lancashire, for he was Principal of the Blackburn Technical College some years ago, also a member of the Textile Institute Council, since when he has been Principal of the Battersea Polytechnic. His knowledge of the cotton industry, which he acquired during his lengthy service at Blackburn, should materially assist him in his new work. Moreover, Dr. Pickard has also a knowledge of the requirements of industry in the matter of research, as he has acted as Director for the British Leather Manufacturers' Association since 1920.

REVIEWS.

A POCKET GUIDE TO THE WEST INDIES. Algernon Aspinall, C.B.E., C.M.G., Sifton, Praed & Co., London. Pages xiv + 493.

Mr. Aspinall, Secretary to the West India Committee and Secretary to the Imperial College of Tropical Agriculture, has a remarkable knowledge of the West Indies and West Indian affairs as a result of his long association with them and his several visits to these islands. The Pocket Guide was first published in 1907 and the present is the 4th revised Edition. In each Edition the information has been brought up to date and the historical records have been increased. The number and excellence of the maps and the increased number of illustrations add greatly to the interest and usefulness of the well-arranged information, which is presented for the use of the visitor to the West Indies. Although it is called "A Pocket Guide to the West Indies," it is a guide book also to British Guiana, British Honduras, and the Panama Canal Zone.

The Pocket Guide should be in the possession of every tourist or prospective visitor to the West Indies, and it would form a valuable addition to the library of anyone who is interested in the history or the present conditions of the islands and colonies of the Caribbean region. The volume runs to nearly 500 pages with many excellent maps and illustrations, and the printing is very well done on good quality paper. The list of books on the West Indies furnishes a guide to extensive reading, covering the whole period from the early voyages of discovery to the present time.

H. A. B.

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FERTILISERS FOR SOUTH AFRICAN FRUITS. Published by *The Chilean Nitrate Company* (South African Delegation), P.O. Box 2233, Capetown, 1926.

This pamphlet, sent post free on request, sets out the well-known advantages of nitrate of soda as fertilizer for use in the cultivation of crops. It describes the application of the substance to some thirty different species of South African edible fruit plants. The section dealing with nutrient requirements of plants, requires bringing up to date, but the sections presenting practical details for applying manures, and sundry useful pieces of information, are excellent.

F. H.

* * *

AN OUTLINE OF PLANT GEOGRAPHY—By D. H. Campbell. Macmillan, London 1926. 17s. net. pp. viii+392.

Professor Campbell is perhaps best known as one of the leading authorities on the botany of the mosses and ferns and their allies. In the course of many years of travel the quest of botanical material has led him into all sorts of interesting countries and regions, and he has made good use of the opportunities thus afforded for general observations of different types of vegetation and their relations to each other. Supplemented for the sake of completeness by a certain amount of data from the literature of the subject, the notes and photographs accumulated on these journeys have made a very pleasant book, presenting in the minimum number of words a vivid picture of the vegetation in all the countries of the world. Of the illustrations, numbering over a hundred and fifty, many are not only of botanical interest, but reach a high standard of pictorial excellence.

E. E. C.

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BUECHEL: THE COMMERCE OF AGRICULTURE. The Wiley Agricultural Series. pp. X + 440. New York: Wiley & Sons, Inc., London. Chapman and Hall, Ltd., 1926.

This book is full of information, well written, and excellently produced. The purpose of the work "is to present to the student of agricultural economics, both in and out of college, a broad world picture of present day agriculture. For the college student in particular it is designed to lay the foundation for the more specialised courses, both technological and economic, which properly come later in the college curriculum." It fulfils this purpose adequately. The opening chapters deal with the relation of people to land and the recent revival of interest on population problems is briefly touched upon. A survey of the land resources of the world leads naturally to a consideration of the physical and biological basis of agricultural production and in Part II, the influence of these factors is discussed generally, to be followed up by an account of the special features of the low and middle latitudes and the Polar lands. Particular consideration of parts of America serve to illustrate the remarks on the influence of soils, altitude and land formation.

The "food, fibre and forest resources of the world" are then dealt with under rough classifications. On the whole these chapters are very good, but in some cases the information could have been amplified. The discussion of valorisation coffee in Brazil, for example, is closed at 1908 and no attention is paid to the negotiations in which Sielcken was involved. The "so-called Stevenson plan" is not referred to as a price stabilisation scheme although in another section on Mexican henneqúin (used as binding twine in America), the author devotes a paragraph to the benefits of price stability. The inclusion of a final section on trade is a good idea, but as opposed to the rest of the book it is rather scrappy, *e.g.*: in speaking of trade policies he practically defines protectionism as "placing a tax on goods imported into this country in order to prevent too great an influx of goods, which would tend to lower the price of this class of goods paid to American producers." The frequent reference to American conditions is purely illustrative, but in view of the title of the book conditions in other lands might well be referred to.

G. W.

COLLEGE NEWS.

An illustrated "Sugar Supplement" is being prepared and will be circulated with *Tropical Agriculture* when completed.

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An oil painting of Sir Francis Watts, the First Principal of the College, has been placed in the entrance of the new building.

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Mr. L. S. Birkett, a student of the College, has been selected for the West Indian Team which is to visit England next season.

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Mr. G. Evans, M.A., C.I.E., has been appointed Principal of the College. During the last session Mr. Evans was Acting Principal.

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At the end of June, Mr. Moerdyk, a post-graduate student, sailed for Costa Rica to study the cultivation of coffee before returning to South Africa.

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Drs. W. M. Forbes and P. P. Babry, Professors of Entomology in Cornell University, Ithaca, New York, visited the College on 10th July. They have recently been engaged in investigations in Surinam.

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Mr. S. Fukushima of Tokyo, Japan, recently visited the College. He is connected with the sugar industry of Formosa, and is interested in the purchasing of high grade cocoa, and in the manufacture of chocolate.

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At the last meeting of the Science Club Sir Francis Watts gave a most interesting address entitled "Some West Indian Notes" the substance of which will be printed in a future issue of *Tropical Agriculture*.

* * *

Sir Francis Watts, *Emeritus Principal* of the College, together with Lady Watts, sailed for England on the S. S. *Bayano* on Tuesday, 28th June. Sir Francis will proceed from England to South Africa to attend the 11th Congress of the Federation of Chambers of Commerce of the British Empire.

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Mr. J. F. Rorke, a cotton grower on a large scale in North-Eastern Brazil visited the College on 27th June. Mr. Rorke was particularly interested in discussing certain problems of cotton cultivation and pest control with the officers of the Cotton Research Station and with the Commissioner of Agriculture.

* * *

Dr. H. R. Briton-Jones left Trinidad on the 11th July for an official tour of the Northern Islands. He has two main objects in view, namely, to ascertain the distribution of the Wither-Tip disease of limes, and to make a study of the Root disease of limes in Dominica. In view of the recent findings in Ceylon it will be necessary to study *de novo* the aetology of root disease in limes and other crops in the West Indies with a view to devising satisfactory means of combating the malady.

* * *

We regret to announce the death of the Hon. R. G. Bushe, C.M.G., B.A., who passed away on the 13th of July after a brief illness. On the foundation of the College he was Senior Financial Officer of the Colony, and became a member of the Governing Body. As Chairman of the Executive Committee, which represents the College in local affairs, Mr. Bushe rendered invaluable services, and it was with great regret that his resignation was accepted on the 18th of June, 1926. His active interest in the College, however, never ceased, and he continued to serve on the Committee until his death.

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Mr. Hugh C. Sampson, M.A., C.I.E., was a recent visitor to the College. The appointment of Mr. Sampson as Economist Botanist, Royal Botanic Gardens, Kew, was mentioned in the July issue of *Tropical Agriculture*, Mr. Sampson at present is on a mission to British Guiana, but *en route* is spending a few days in Trinidad and making the trip to St. Kitts and then to British Guiana by the steamers of the Canadian Government Merchant Marine. In Trinidad Mr. Sampson has visited the College, the Trinidad Department of Agriculture, the Research Station of the Empire Cotton Growing Corporation, and several estates.

* * *

The Sessional Examinations were concluded on the 28th June. The following students have been awarded Sugar Certificates.

Fourth Year.

J. G. Davies
H. B. Springer

The following students have passed their 3rd Year Examination and have become eligible to receive the College Diploma :—

J. A. Potter
J. A. McDonald
R. M. Steven

The following students have passed their 2nd Year Examination :—

M. Aspiazu
F. McG. Bain
L. S. Birkett
A. C. G. Palmer
G. E. L. Spencer

The following students have passed their 1st Year Examination :—

H. L. Grogan
R. S. Hanomansingh
A. W. G. Sheffield

THE Texas Oil Company has very generously given to the College samples of the principal lubricating oils used in their Sugar Factory, also two bound volumes of their publication "Lubrication." These will be a great asset in demonstrating the uses of oils to the students.

TREND OF THE MARKETS.

[*The notes below are based principally upon running charts of the prices of the basic grades and upon general statistical information gleaned from contemporary publications and cablegrams and are intended to be a record of movements. An attempt is made, where possible, to indicate the market outlook at the time of going to press, but no responsibility for the accuracy and subsequent truth of such observations is assumed. Unless otherwise stated the prices quoted are spot, London.*]

SUGAR :—Throughout June sugar had a disappointing market although at the close there was a better feeling. The proposal to consign surplus crops from Queensland and the Argentine, the pressure of offers of Java sugar and Mr. Lichts estimates of increased beet sowings were unfavourable factors. At the lowest point Cuban declined to 12*s.* 9*d.* c.i.f. while British preferential sold at 16*s.* 6*d.*, a decline of 1*s.* 9*d.* to 2*s.* per cwt. on the month. In early July the market was better, but the rise in price claimed to have been made in certain sections was small. The buying of Raw Sugar by British and Continental refiners was a marked feature, the principal business being done in Cuban and San Domingo Centrifugals at very steady prices for shipment July to August. Grocery kinds were more active, the prospective shortage of Crystallised West Indian becoming still more apparent. Prices at the time of going to press (21st July) were as follows :—Foreign 96°, c.i.f., per cwt. 13*s.* 1*d.*, Preferential 16*s.* 6*d.*; Yellow crystals landed, duty paid, 30*s.* to 39*s.* 6*d.*

COTTON :—The market has been largely a weather market, and while, on the whole, climatic conditions were not as good as they ought to be at this time of the year, they were sufficiently improved to prevent fresh buying and bring out long liquidations. Business in the Liverpool market has been on the quiet side and not particularly interesting. Operators are waiting but business in actual has shown improvement especially for low grades. There is very little enquiry for new crop yet. News from Manchester is depressing, Continental advices show no change but business is considered good. From statistics of spinners takings it looks fairly certain that the whole of this season's huge crop will have been taken by the spinners of the world. In Egyptian cotton an improved turnover on the spot and forward has been in evidence this week and Sudans continue to move off freely. The Liverpool Circular (24th June) states that Sea Island (16th July c.i.f. per lb. 3*s.* 6*d.*; extra fine 3*s.*; fine 2*s.* 8*d.*; good 2*s.* 4*d.*) has been quiet, moderate business has been done in Egyptian and good business in African, while East Indian is unchanged.

COCOA :—After a quiet period in early June, cocoa at the end of the month became cheaper especially for West African. The summer business is poor but there is already promising enquiry for autumn shipment. Board of Trade Returns for May give the following figures :—imports 35,609 cwt. (1926; 32,975); total, January to May, 793,880 (1926; 861,225); stocks 597,000 (1926; 775,000). Quotations on 21st July in London were Trinidad L.L.T. 82*s.* to 87*s.*; Grenada L.L.T. 78*s.* to 80*s.*; in New York, Trinidad Estates, ex quay per lb. 17¼c.; Grenada Estates 16⅝c.

COFFEE :—The quantity offered for auction for the week ending 2nd July was 12,258 bags. This amount included 7,542 bags Costa Rica, 1,981 bags East Indian, and 1,812 bags African. The finer qualities are being somewhat neglected on account of the quiet export trade, but with the present crop almost exhausted these qualities will be wanted at an early date. Kenya is cheaper on the average, as a good bulk had to be placed and the standard of quality was not high. Some wonderful Nicaragua made 203*s.* 6*d.* with Colombian at 100*s.* and Matagalpa at 108*s.* At the end of June, 30 barrels of fair washed Jamaica were offered and realised for 130*s.* to 140*s.* Jamaica good ordinary is valued at 90*s.* to 92*s.* nominal.

COPRA :—At the beginning of July sales of copra included Malabar at £25 11*s.* 3*d.*, Zanzibar at £25 18*s.* 9*d.*, Seychelles at £26 18*s.* 9*d.*, Mauritius at £26 16*s.* 3*d.*, and outside Empire production Java at £27 1*s.* 3*d.*, and Cebu at £25 18*s.* 9*d.* per ton. London quotations for the West Indies, 21st July, was £26 2*s.* 6*d.*; New York, sun dried, c.i.f., $5.25, Trinidad select coconuts, ex quay, duty paid, fetched $21.25 per 1,000.

RUBBER :—At from 18⅜*d.* to 19*d.* per lb. large quantities for delivery monthly in 1928 have been placed. The Para market is firmer; hard fine, 17*d.* paid.

TEA :—An excellent business is passing with Darjeeling average at 29.51*d.*, Ceylon at 20.16*d.*, and Sumatran at 18.95*d.*, Java is dearer and Chinese tea is dull.

SPICES :—The market for *pimento* (ca. 8½*d.* per lb., spot) has been somewhat irregular. End of June arrivals of *Ginger* found a ready sale at advancing prices, common lean to good middling Jamaica is quoted at 70*s.* to 95*s.* Buyers are showing more interest in West Indian *Nutmegs* (16th July; Unassorted, sound brown, F.A.Q., 1*s.* 2½*d.*). Fair, pale, and red *mace* stood at 3*s.* 10*d.* on 16th July.

MISCELLANEOUS :—The market is firm for *Linseed* and *palm kernel cake*, very dull for *cotton-seed* and *coconut*, but not as a whole discouraging. There is steady buying of *palm kernels*. *Palm oil* is now cheaper and good business is being done (Lagos supplies, September shipment, £31 12*s.* 6*d.* per ton). *Ground-nuts* (*arachis*) are encouraging (Bombay, £20 5*s.* per ton); *arachis oil* comes at £52 per ton for deodorised and £46 for extracted.